Data Examples

Announcements

Examples: Lists

Lists in Environment Diagrams

Assume that before each example below we execute:

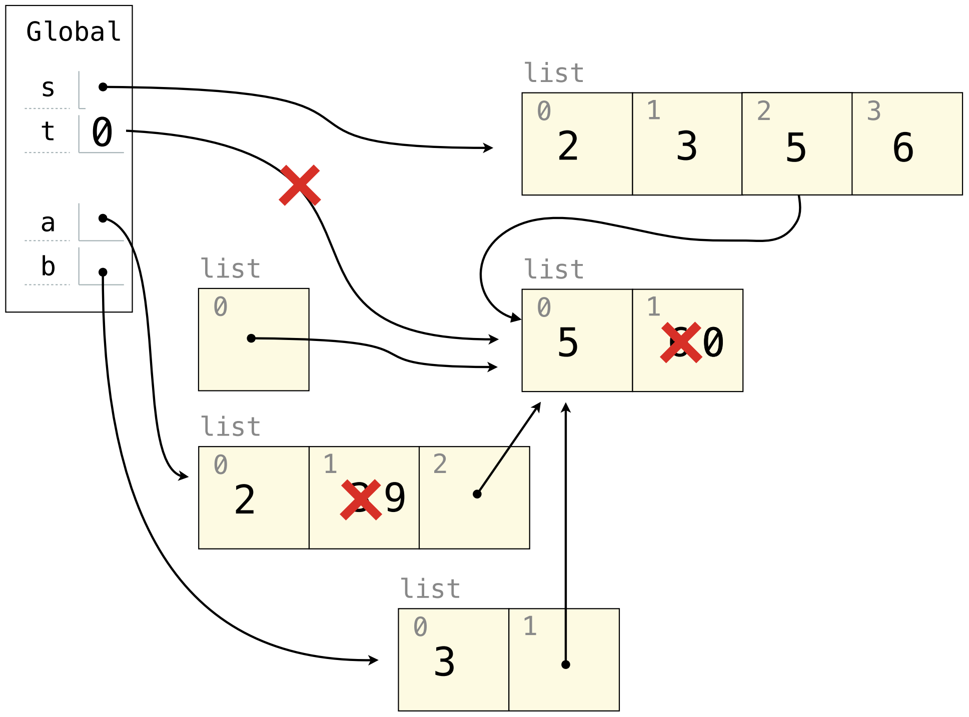
```
s = [2, 3]
t = [5, 6]
```

Operation	Example	Result

append adds one element to a list	s.append(t)
	t = 0
		s → [2, 3, [5, 6]]
		t → 0

extend adds all elements in one list to another list	s.extend(t)
	t[1] = 0
		s → [2, 3, 5, 6]
		t → [5, 0]

addition & **slicing** create new lists containing existing elements	a = s + [t]
	b = a[1:]
	a[1] = 9
	b[1][1] = 0
		s → [2, 3]
		t → [5, 0]
		a → [2, 9, [5, 0]]
		b → [3, [5, 0]]



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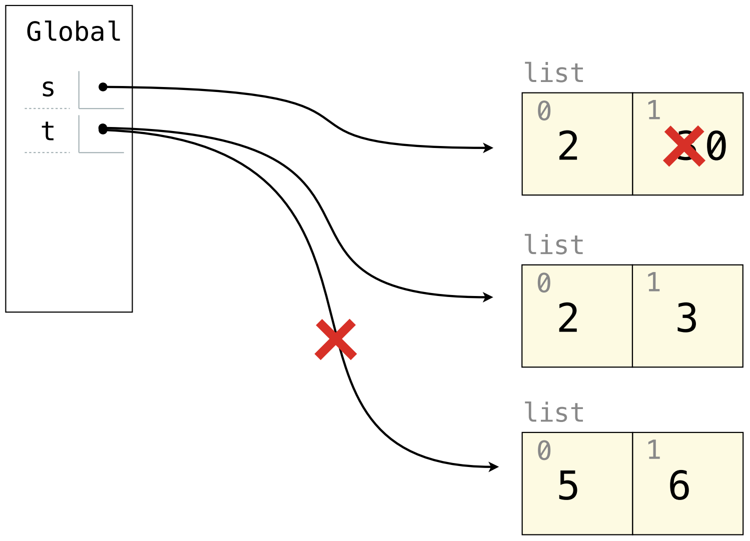
The **list** function also creates a new list containing existing elements	t = list(s)
	s[1] = 0
		s → [2, 0]
		t → [2, 3]



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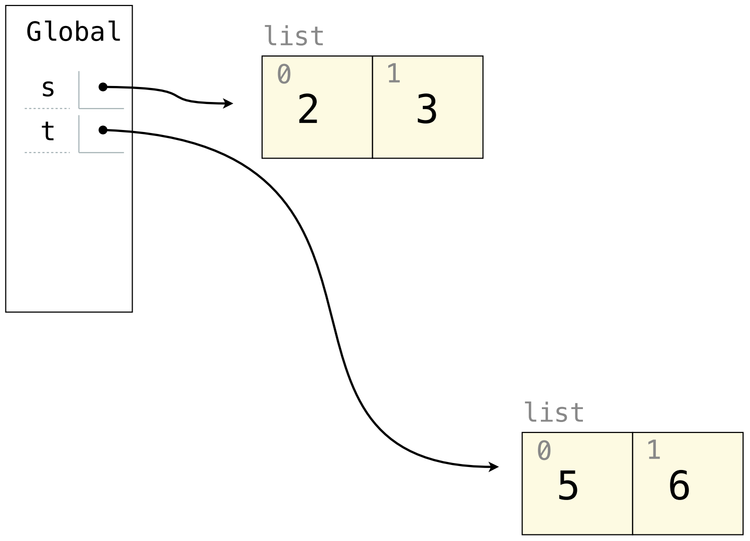
slice assignment replaces a slice with new values	s[0:0] = t s[3:] = t t[1] = 0	



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	s[1] = 0
		s → [2, 0]
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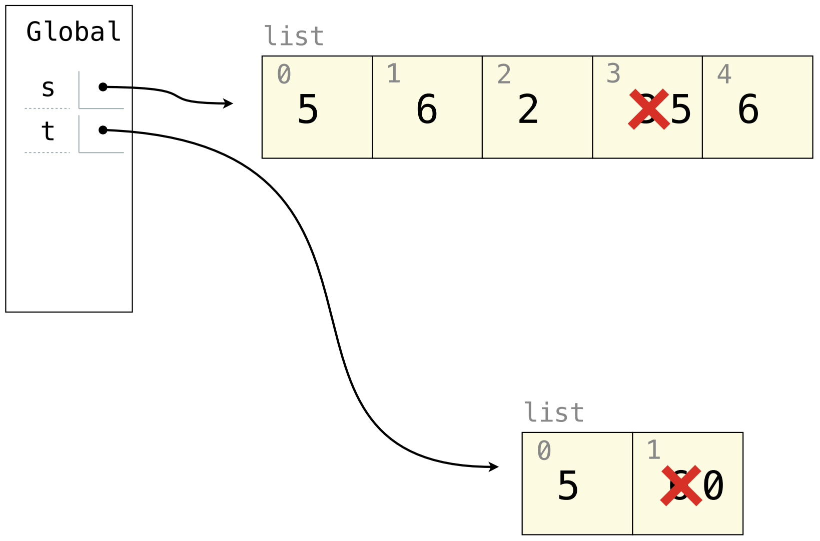
slice assignment replaces a slice with new values	s[0:0] = t s[3:] = t t[1] = 0	s → [5, 6, 2, 5, 6] t → [5, 0]



Lists in Environment Diagrams

Assume that before each example below we execute:

```
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Operation	Example	Result
pop removes & returns the last element	t = s.pop()	s → [2] t → 3

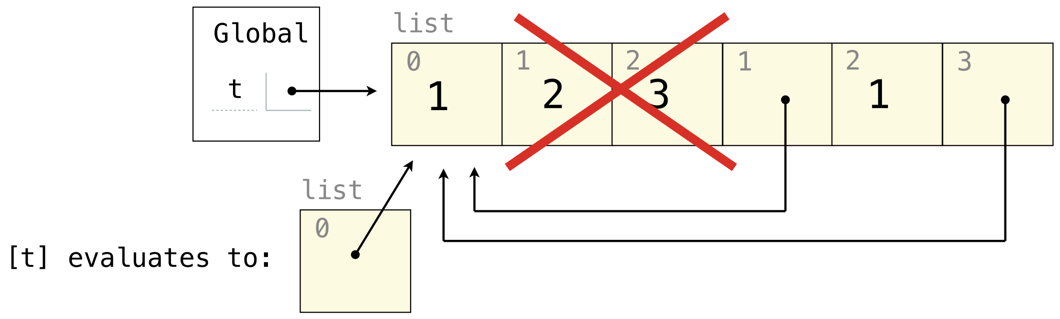
remove removes the first element equal to the argument	t.extend(t)
	t.remove(5)
		s → [2, 3]
		t → [6, 5, 6]

slice assignment can remove elements from a list by assigning [] to a slice.	s[:1] = [] t[0:2] = []	s → [3] t → []

pop( )是删除最后一个元素，返回值是被删除的元素

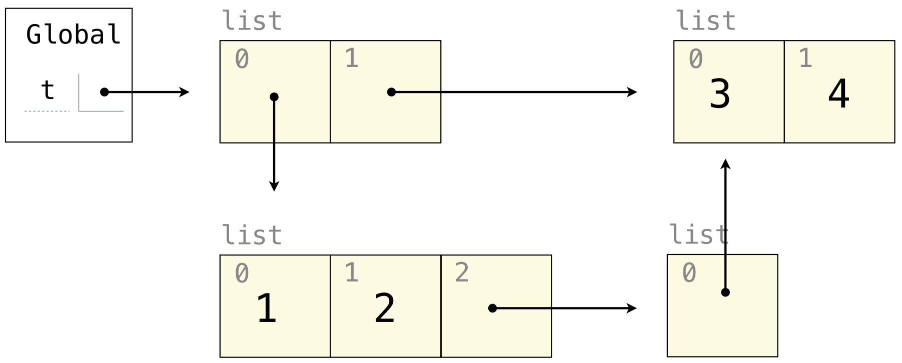
Lists in Lists in Lists in Environment Diagrams

```
t = [1, 2, 3]
t[1:3] = [t]
t.extend(t)
```



```
[1, [...], 1, [...]]
```

```
t = [[1, 2], [3, 4]]
t[0].append(t[1:2])
```



```
[[1, 2, [[3, 4]]], [3, 4]]
```

Examples: Objects

Land Owners

Instance attributes are found before class attributes; class attributes are inherited

```
class Worker:
    greeting = 'Sir'
    def __init__(self):
        self.elf = Worker
    def work(self):
        return self.greeting + ', I work'
    def __repr__(self):
        return Bourgeoisie.greeting

class Bourgeoisie(Worker):
    greeting = 'Peon'
    def work(self):
        print(Worker.work(self))
        return 'I gather wealth'

jack = Worker()
john = Bourgeoisie()
jack.greeting = 'Maam'
```

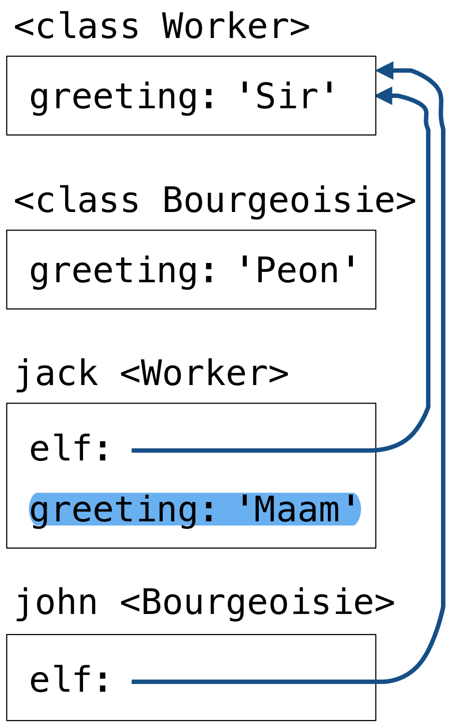
```
>>> Worker().work()
'Sir, I work'

>>> jack
Peon

>>> jack.work()
'Maam, I work'

>>> john.work()
Peon, I work
'I gather wealth'

>>> john.elf.work(john)
'Peon, I work'
```



Examples: Iterables & Iterators

Using Built-In Functions & Comprehensions

What are the indices of all elements in a list s that have the smallest absolute value?

```
[-4, -3, -2,  3,  2,  4] ▷ [2, 4]       [1, 2, 3, 4, 5] ▷ [0]
  0   1   2   3   4   5
```

What's the largest sum of two adjacent elements in a list s? (Assume len(s) > 1)

```
[-4, -3, -2,  3,  2,  4] ▷ 6            [-4,  3, -2, -3,  2, -4] ▷ 1
```

list(zip(s[:-1], s[1:]))

Create a dictionary mapping each digit d to the lists of elements in s that end with d.

```
[5, 8, 13, 21, 34, 55, 89] ▷ {1: [21], 3: [13], 4: [34], 5: [5, 55], 8: [8], 9: [89]}
```

{ d : [x for x in s if x % 10 == d] for d in range(10) if any([x % 10 == d for x in s]) }

Does every element equal some other element in s?

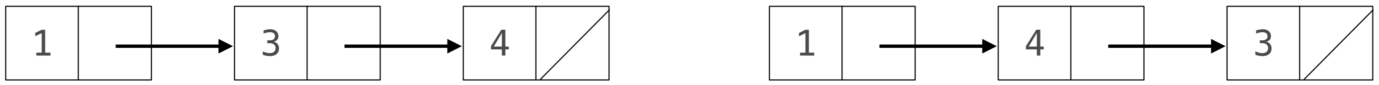
```
[-4, -3, -2,  3,  2,  4] ▷ False        [4, 3, 2, 3, 2, 4] ▷ True
```

all( )

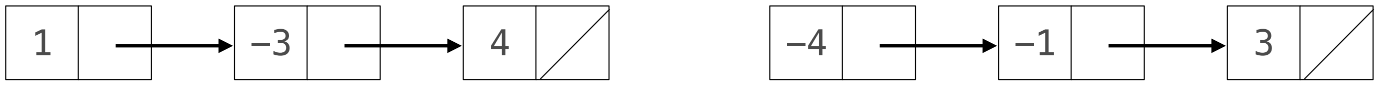
Examples: Linked Lists

Linked List Exercises

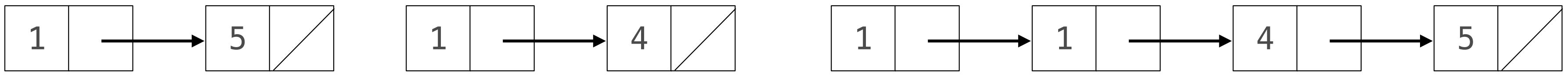
Is a linked list s ordered from least to greatest?



Is a linked list s ordered from least to greatest by absolute value (or a key function)?



Create a sorted Link containing all the elements of both sorted Links s & t.



Do the same thing, but never call Link.